Appendix B – HAI Model Release 5.0a Inputs, Assumptions and Default Values

This appendix provides a list of the HAI Model Release 5.0a user inputs, as well as their definitions and the default values set in the model. The Appendix is organized based on the series of user input dialogue boxes that are used to set parameters in the HAI Model interface. This yields the following hierarchy:

Input Parameter Category (distribution, feeder, wire center, expense, and excavation)
Category dialogue box (NID, drop, switching parameters, etc.)
User Input field (fiber strands per remote terminal, etc.)

The appendix is organized into two sections. The first contains the index of dialogue boxes and specific user input fields. The second lists the inputs with their definitions and default values. These are numbered sequentially from B1 through B201. To facilitate cross-referencing between the two sections, each user-input field in the first section contains a numbered entry from the second section. Thus, for instance, the "B1" next to the Residential NID Materials, No Protector entry refers to the first item in the second section of the appendix.

With this organization, the appendix allows a user who is examining a given user input dialogue box and specific user input field to locate that box/field in the index in the first section, read the number of the corresponding input definition, and use that number to locate the input definition and default value in the second section.

Note that a few parameters are set in one module but used by several modules. In such cases, the parameter appears only once, but its use in other modules is noted at the end of each input parameter category in this index.

PART 1: INDEX OF DIALOGUE BOXES AND USER INPUT FIELDS

Distribution

NID

B1	Residential NID Case, no protector
B1	Residential NID Basic Labor
B1	Residential Protection Block, per pair
B1	Business NID Case, no protector
B1	Business NID Basis Labor
B1	Business Protection Block, per pair
B1	Indoor NID Case

Drop

B2	Drop Distance
B3	Aerial Drop Installation, total
B3	Buried Drop Installation/foot
B4	Buried Drop Sharing Fraction
B5	Buried Drop Fraction
B6	Average Lines Per Business Locations
B7	Buried Terminal and Splice per Line
B7	Aerial Terminal and Splice per Line
B8	Buried Drop Investment per Foot
B8	Aerial Drop Investment per Foot
B8	Buried Pairs
B8	Aerial Pairs

Cable and Riser Investment

B9	Distribution Cable Size
B10	Distribution Cable, $/foot
B11	Riser Cable Size
B11	Riser Cable, $/foot

Poles and Conduit

B12	Pole Investment
B12	Pole Labor
B13	Buried Cable Sheath Multiplier
B14	Conduit Investment per Foot
B15	Spare Tubes per Route
B16	Regional Labor Adjustment Factor (Note: This parameter can now be found after the Excavation and Restoration section, at the end of this document.)

Placement Fraction

B17	Aerial Fraction
B17	Buried Fraction
B17	Underground Fraction
B17	Buried Fraction Available for Shift

Cable Sizing Factors and Pole Spacing

B18 Cable Sizing Factors
B19 Pole Spacing

Geology and Clusters

B20 Difficult Terrain Distance Multiplier
B21 Rock Depth Threshold, inches
B22 Hard Rock Placement Multiplier
B23 Soft Rock Placement Multiplier
B24 Sidewalk / Street Fraction
B25 Maximum Analog Copper Total Distance
B26 Feeder Steering Enable
B27 Maximum Feeder Route/Air Multiplier
B27a Require Serving Areas to be Square

Long Loop Investments

B28 T1 Repeater Investments, Installed
B29 CO Mux Capacity, Installed
B30 RT Cabinet & Common Equipment, Installed
B31 T1 Channel Unit Investment per Subscriber
B32 COT Investment per RT, Installed
B33 T1 Remote Terminal Fill Factor
B34 Maximum T1s per Cable
B35 T1 Repeater Spacing
B36 Aerial T1 Attenuation
B37 Buried T1 Attenuation

SAI Investment

B38 Cable Size
B38 Indoor SAI
B38 Outdoor SAI

Dedicated Circuit Inputs

B39 Percentage of Dedicated Circuits
B40 Pairs per Dedicated Circuit

Wireless Investment

B41 Wireless Investment Cap Enable
B42 Wireless Point to Point Investment Cap - Distribution
B43 Wireless Common Investment
B44 Wireless Per Line Investment
B45 Maximum Broadcast Lines per Common Investment

Feeder

Copper Placement

B46 Aerial Fraction
B46 Buried Fraction
B46 Underground Fraction
B47 Manhole Spacing, /ft.

B48	Pole Spacing, ft.
B49	Pole Materials
B49	Pole Labor
B50	Inner Duct Investment per Foot

Fiber Placement

B51	Aerial Fraction
B51	Buried Fraction
B51	Underground Fraction
B51	Buried Fraction Available for Shift
B52	Pullbox Spacing, ft.
B53	Buried Fiber Sheath Addition per Foot

Cable Sizing Factors

B54	Copper Feeder Cable Sizing Factors
B55	Fiber Feeder Cable Sizing Factor

Cable Costs

B56	Copper Investment per foot
B56	Copper Investment per Pair-foot
B57	Fiber Investment per foot
B57	Fiber Investment per Strand-foot

DLC Equipment

B58	High Density DLC Remote Terminal – Site and Power
B58	Low Density DLC Remote Terminal – Site and Power
B59	High Density DLC Remote Terminal – Maximum Lines
B59	Low Density DLC Remote Terminal – Maximum Lines
B60	High Density DLC Remote Terminal – RT Fill Factor
B60	Low Density DLC Remote Terminal – RT Fill Factor
B61	High Density DLC Remote Terminal – Common Equipment Investment
B61	Low Density DLC Remote Terminal – Common Equipment Investment
B62	High Density DLC Remote Terminal – POTS Channel Unit Investment
B62	Low Density DLC Remote Terminal – POTS Channel Unit Investment
B62	High Density DLC Remote Terminal – Coin Channel Unit Investment
B62	Low Density DLC Remote Terminal – Coin Channel Unit Investment
B63	High Density DLC Remote Terminal – POTS Lines per CU
B63	Low Density DLC Remote Terminal – POTS Lines per CU
B63	High Density DLC Remote Terminal – Coin Lines per CU
B63	Low Density DLC Remote Terminal – Coin Lines per CU
B64	LD Crossover Lines
B65	High Density DLC Remote Terminal – Fibers per RT
B65	Low Density DLC Remote Terminal – Fibers per RT
B66	High Density DLC Remote Terminal – Optical Patch Panel
B66	Low Density DLC Remote Terminal – Optical Patch Panel
B67	Copper Feeder Max Distance, ft
B68	High Density DLC Remote Terminal – Common Equipment Investment per 672 Lines
B68	Low Density DLC Remote Terminal – Common Equipment Investment per 120 Lines
B69	High Density DLC Remote Terminal – Number of Max Line Modules / RT
B69	Low Density DLC Remote Terminal – Number of Max Line Modules /

RT

Copper Manhole Investment

B70	Materials
B70	Frame and Cover
B70	Site Delivery
B70	Excavate and Backfill
B71	Dewatering Factor for Manhole Placement
B72	Water Table Depth for Dewatering

Fiber Pullbox Investment

B73	Materials
B73	Installation

Note: The Feeder Module also uses inputs B13-B15.

Switching and Interoffice Transmission

End Office Switching

B74	Real time (BHCA)
B75	Traffic (BHCCS)
B76	Switch maximum line size
B77	Switch port administrative fill
B78	Switch maximum processor occupancy
B79	MDF/protector investment per line
B80	Analog line circuit offset of DLC per line
B81	Switch installation multiplier
B82	End Office Switching Investment Constant – BOC and Large ICO
B82	End Office Switching Investment Constant – Small ICO
B83	End Office Switching Investment Slope Term
B84	Processor Feature Loading Multiplier - Normal
B84	Processor Feature Loading Multiplier - Heavy business
B85	Processor Feature Loading Multiplier - Business penetration threshold

Wire Center

B86	Lot size, multiplier of switch room size
B87	Tandem/EO common factor
B88	Power
B89	Switch Room Size, square ft.
B90	Construction, square ft.
B91	Land, square ft.

Traffic Parameters

B92	Local Call Attempts
B93	Call Completion Factor
B94	IntraLATA Calls Completed
B95	InterLATA Intrastate Calls Completed
B96	InterLATA Interstate Calls Completed
B97	Local DEMs, thousands

B98	Intrastate DEMs, thousands
B99	Interstate DEMs, thousands
B100	Local Business/Residential DEMs
B101	Intrastate Business/Residential DEMs
B102	Interstate Business/Residential DEMs
B103	BH Fraction of Daily Usage
B104	Annual to Daily Usage Reduction Factor
B105	Residential Holding Time Multiplier
B105	Business Holding Time Multiplier
B106	Residential Call Attempts/BH
B106	Business Call Attempts/BH

Interoffice Investment

B107	OC-48 ADM, installed, 48 DS-3s
B107	OC-48 ADM, installed, 12 DS-3s
B107	OC-3/DS-1 Terminal Multiplexer, installed, 84 DS-1s
B107	Investment per 7 DS-1s
B108	Number of Fibers
B109	Pigtail Investment
B110	Optical Distribution Panel
B111	EF&I, per hour
B112	EF&I, hours
B113	Regenerator, installed
B114	Regenerator Spacing, miles
B115	Channel Bank Investment/24 lines
B116	Fraction of SA lines requiring multiplexing
B117	Digital Cross Connect System, installed per DS3
B118	Transmission Terminal Fill (DS-0 level)
B119	Fiber Cable
B120	Number of Strands per ADM
B121	Buried Fraction
B121	Aerial Fraction
B122	Buried Placement
B122	Conduit Placement
B123	Buried Sheath Addition
B124	Conduit
B125	Pullbox Spacing
B126	Spare Tubes per route
B126	Pullbox Investment
B127	Pole Spacing, ft.
B128	Pole Material
B128	Pole Labor
B129	Fraction of poles and buried/underground placement common with feeder
B130	Fraction of aerial structure assigned to telephone
B130	Fraction of buried structure assigned to telephone
B130	Fraction of underground structure assigned to telephone

Transmission Parameters

B131	Operator Traffic Fraction
B132	Total Interoffice Traffic Fraction
B133	Maximum Trunk Occupancy, CCS
B134	Trunk Port, per end

B135	Direct Routed fraction of local interoffice
B136	Tandem Routed fraction of intraLATA traffic
B137	Tandem Routed fraction of interLATA traffic
B138	POPs per Tandem Location
B139	Threshold Value for Off-Ring Wire Centers
B140	Remote – Host Fraction of Interoffice Traffic
B141	Host – Remote Fraction of Interoffice Traffic
B142	Maximum Nodes per Ring
B142a	Ring Transiting Traffic Factor
B142b	Intertandem Fraction of Tandem Trunks

Tandem Switching

B143	Real Time Limit, BHCA
B144	Port Limit, trunks
B145	Common Equipment Investment
B146	Maximum Trunk Fill
B147	Maximum Real Time Occupancy
B148	Common Equipment Intercept Factor
B149	Entrance Facility Distance from Serving Wire Center & IXC POP

Signaling

B150	STP Link Capacity
B151	STP Maximum Fill
B152	STP investment, per pair, maximum
B153	STP investment, per pair, minimum
B154	Link Termination, both ends
B155	Signaling Bit Rate
B156	Link Occupancy
B157	C Link Cross Section
B158	ISUP Messages per interoffice BHCA
B159	ISUP Messages length, bytes
B160	TCAP Messages per transaction
B161	TCAP Message Length, bytes
B162	Fraction of BHCA requiring TCAP
B163	SCP investment/transaction/second

OS and Public Telephone

B164	Investment per position
B165	Maximum Utilization per position, CCS
B166	Operator Intervention Factor
B167	Public Telephone Equipment Investment, per station

ICO Parameters

B168	ICO STP Investment per line, Equipment
B169	ICO Local Tandem Investment per line, Equipment
B170	ICO OS Tandem Investment per line, Equipment
B171	ICO SCP Investment per line, Equipment
B172	ICO STP/SCP Wire Center Investment per line
B173	ICO Local Tandem Wire Center Investment per line
B174	ICO OS Tandem Wire Center Investment per line
B175	ICO C-Link / Tandem A-Link Investment per line
B175a	Equivalent Facility Investment per DS0
B175b	Equivalent Terminal Investment per DS0

Host / Remote Assignment

B176 Host – Remote CLLI Assignments
B177 Host – Remote Assignment Flag

Host / Remote Investment

B177a Line Size Designation
B177b Fixed and per Line Investment

Expense

Cost of Capital

B178 Cost of Debt
B178 Debt Fraction
B178 Cost of Equity

Depreciation and Net Salvage

B179 Motor Vehicles
B179 Garage Work Equipment
B179 Other Work Equipment
B179 Buildings
B179 Furniture
B179 Office Support Equipment
B179 Company Comm. Equipment
B179 General Purpose Computer
B179 Digital Electronic Switching
B179 Operator Systems
B179 Digital Circuit Equipment
B179 Public Telephone Terminal Equipment
B179 Poles
B179 Aerial Cable – metallic
B179 Aerial Cable – non metallic
B179 Underground Cable – metallic
B179 Underground Cable – non metallic
B179 Buried Cable – metallic
B179 Buried Cable – non metallic
B179 Intrabuilding Cable – metallic
B179 Intrabuilding Cable – non metallic
B179 Conduit Systems

Expense Assignment

B179a Furniture – Capital Costs
B179a Furniture – Expenses
B179a Office Equipment – Capital Costs
B179a Office Equipment – Expenses
B179a General Purpose Computer – Capital Costs
B179a General Purpose Computer – Expenses
B179a Motor Vehicles – Capital Costs
B179a Motor Vehicles – Expenses
B179a Buildings – Capital Costs

B179a Buildings – Expenses
B179a Garage Work Equipment – Capital Costs
B179a Garage Work Equipment – Expenses
B179a Other Work Equipment – Capital Costs
B179a Other Work Equipment – Expenses
B179a Network Operations
B179a Other Taxes
B179a Variable Overhead

Structure Fraction Assigned to Telephone

B180	Distribution Aerial
B180	Distribution Buried
B180	Distribution Underground
B180	Feeder Aerial
B180	Feeder Buried
B180	Feeder Underground

Other

B181	Income Tax Rate
B182	Corporate Overhead Factor
B183	Other Taxes Factor
B184	Billing/Bill Inquiry per line per month
B185	Directory Listing per line per month
B186	Forward-looking Network Operations Factor
B187	Alternative CO Switching Factor
B188	Alternative Circuit Equipment Factor
B189	EO Non Line-Port Cost Fraction
B190	Per line monthly LNP cost
B191	Carrier – Carrier Customer Service, per line per year
B192	NID Expense per line per year
B193	DS-0/DS-1 Terminal factor
B194	DS-1/DS-3 Terminal factor
B195	Average Lines per Business Location
B196	Average Trunk Utilization

Excavation and Restoration

Underground Excavation

B197	Trenching, per Foot
B197	Backhoe Fraction
B197	Backhoe Cost, per Foot
B197	Hand Trench Fraction
B197	Hand Trench Cost per Foot

Underground Restoration

B198	Cut/Restore Asphalt Fraction
B198	Cut/Restore Asphalt, per Foot
B198	Cut/Restore Concrete Fraction
B198	Cut/Restore Concrete, per Foot
B198	Cut/Restore Sod Fraction
B198	Cut/Restore Sod, per Foot

B198	Simple Backfill, per Foot
B198	Pavement, per Foot
B198	Dirt, per Foot

Buried Excavation

B199	Plow Fraction
B199	Plow per Foot
B199	Trench per Foot
B199	Backhoe Fraction
B199	Backhoe, per Foot
B199	Hand Trench Fraction
B199	Hand Trench, per Foot
B199	Bore Cable Fraction
B199	Bore Cable, per Foot

Buried Installation and Restoration

B200	Push Pipe/Pull Cable Fraction
B200	Push Pipe/Pull Cable per Foot
B200	Cut/Restore Asphalt Fraction
B200	Cut/Restore Asphalt, per Foot
B200	Cut/Restore Concrete Fraction
B200	Cut/Restore Concrete, per Foot
B200	Cut/Restore Sod Fraction
B200	Cut/Restore Sod, per Foot
B200	Restoral Not Required
B200	Simple Backfill

Surface Texture

B201	Percent of cluster Likely Affected and Effect of Texture Code

Labor Adjustment Factors

Labor Adjustment Factor

B16	Regional Labor Factor

Labor Adjustment Factor Weightings

B16a	Contractor Excavation and Restoration
B16a	Telco Construction – Copper
B16a	Telco Construction – Fiber
B16a	Telco Drop/NID Installation and Maintenance
B16a	Contractor Pole Setting

PART 2: INPUT PARAMETER DEFINITIONS AND DEFAULT VALUES

DISTRIBUTION INPUT PARAMETERS

NETWORK INTERFACE DEVICE

B1. NID Investment per line

Definition

The investment in the components of the network interface device (NID), the device at the customers' premises within which the drop wire terminates, and which is the point of subscriber demarcation. The NID investment is calculated as the cost of the NID case plus the product of the protection block cost per line and the number of lines terminated.

Default Values

NID Materials and Installation	
	Costs
Residential NID case, no protector	$10.00
Residential NID basic labor	$15.00
Installed NID case	*$25.00*
Protection block, per line	$4.00
Business NID case, no protector	$25.00
Business NID basic labor	$15.00
Installed NID case	*$40.00*
Protection block, per line	$4.00
Indoor NID Case	$5.00

DROP

B2. Drop Distance

Definition

The average length of a drop cable in each of nine density zones. The drop extends from the NID at the customer's premises to the block terminal at the distribution cable that runs along the street or the lot line.

Default Values

Drop Distance by Density	
Density Zone	**Drop Distance, feet**
0-5	150
5-100	150
100-200	100
200-650	100
650-850	50
850-2,550	50
2,550-5,000	50
5,000-10,000	50
10,000+	50

B3. Drop Placement, Aerial and Buried

Definition

The total placement cost by density zone of an aerial drop wire, and the cost per foot for buried distribution cable placement, respectively.

Default Values

Drop Placement, Aerial & Buried		
Density Zone	**Aerial, total**	**Buried, per foot**
0-5	$23.33	$0.60
5-100	$23.33	$0.60
100-200	$17.50	$0.60
200-650	$17.50	$0.60
650-850	$11.67	$0.60
850-2,550	$11.67	$0.60
2,550-5,000	$11.67	$0.75
5,000-10,000	$11.67	$1.50
10,000+	$11.67	$5.00

B4. Buried Drop Sharing Fraction

Definition

The fraction of buried drop cost that is assigned to the telephone company. The other portion of the cost is borne by other utilities.

Default Value

Buried Drop Sharing Fraction	
Density Zone	**Fraction**
0-5	.50
5-100	.50
100-200	.50
200-650	.50
650-850	.50
850-2,550	.50
2,550-5,000	.50
5,000-10,000	.50
10,000+	.50

B5. Drop Structure Fractions

Definition

The percentage of drops that are aerial and buried, respectively, as a function of density zone.

Default values

Drop Structure Fractions		
Density Zone	**Aerial**	**Buried**
0-5	.25	.75
5-100	.25	.75
100-200	.25	.75
200-650	.30	.70
650-850	.30	.70
850-2,550	.30	.70
2,550-5,000	.30	.70
5,000-10,000	.60	.40
10,000+	.85	.15

B6. Number of Lines per Business Location

Definition

The average number of business lines per business location, used to calculate NID and drop cost. This parameter should be set the same as Parameter B195.

Default Value

B7. Terminal and Splice Investment per line

Definition

The installed cost per line for the terminal and splice that connect the drop to the distribution cable.

Default Value

Terminal and Splice Investment per Line	
Buried	**Aerial**
$42.50	$32.00

B8. Drop Cable Investment, per foot and Pairs per Wire

Definition

The investment per foot required for aerial and buried drop wire, and the number of pairs in each type of drop wire.

Default Values

Drop Cable Investment, per foot		
	Material Cost Per foot	**Pairs**
Buried	$0.140	3
Aerial	$0.095	2

CABLE AND RISER INVESTMENT

B9. Distribution Cable Sizes

Definition

Cable sizes used for distribution cable variables (in pairs).

Default Values

Cable Sizes
2400
1800
1200
900
600
400
200
100
50
25
12
6

B10. Copper Distribution Cable, $/foot

Definition

The cost per foot of copper distribution cable, as a function of cable size, including the costs of engineering, installation, and delivery, as well as the cable material itself.

Default Values

Copper Distribution Cable, $/foot	
Cable Size	**Cost/foot (including engineering, installation, delivery and material)**
2400	$20.00
1800	$16.00
1200	$12.00
900	$10.00
600	$7.75
400	$6.00
200	$4.25
100	$2.50
50	$1.63
25	$1.19
12	$0.76
6	$0.63

B11. Riser Cable, $/foot

Definition

The cost per foot of copper riser cable (cable inside high-rise buildings), as a function of cable size, including the costs of engineering, installation, and delivery, as well as the cable material itself.

Default Values

Riser Cable, $/foot	
Cable Size	**Cost/foot (including engineering, installation, delivery and material)**
2400	$25.00
1800	$20.00
1200	$15.00
900	$12.50
600	$10.00
400	$7.50
200	$5.30
100	$3.15
50	$2.05
25	$1.50
12	$0.95
6	$0.80

POLES AND CONDUIT

B12. Pole Investment

Definition

The installed cost of a 40-foot Class 4 treated southern pine utility pole

Default Value

Pole Investment	
Materials	$201
Labor	$216
Total	*$417*

B13. Buried Copper Cable Sheath Multiplier (feeder and distribution)

Definition

The additional cost of the filling compound used in buried cable to protect the cable from moisture expressed as a multiplier of the cost of non-filled cable.

Default value

1.04

B14. Conduit Material Investment per foot

Definition

Material cost per foot for 4" PVC.

Default Value

$0.60

B15. Spare Tubes per Route (distribution)

Definition

The number of spare tubes (i.e., conduit) placed per route.

Default Value

1

B16. Regional Labor Adjustment Factor (moved to the end of this document)

Note: This parameter is moved to the end of the document, page 77.

PLACEMENT FRACTION

B17. Distribution Structure Fractions

Definition

The distribution cable structure fractions are the relative amounts of different structure types supporting distribution cable in each density zone. Aerial distribution cable is attached to telephone poles or buildings, buried cable is laid directly in the earth, and underground cable runs through underground conduit. In the highest two density zones, aerial structure includes riser and block cable.

The buried fraction available for shift parameter is defined as the fraction of buried cable input value that is available to be shifted to aerial or the fraction of the input value by which the amount of buried cable can increase. If, for example, the user has entered an initial value of 0.5 for the buried cable fraction in a given density zone and then enters 0.6 as the buried fraction available for shift, the model can allow the computed buried fraction (according to local surface and bedrock conditions) to vary up or down by 0.3 (60% of 0.5), and thus lie between 0.2 and 0.8. Separate values must be entered for each density range, and the computed fraction of buried cable is not allowed by the model to exceed 1.0. Note that the parameter and associated process are applied to both distribution and feeder cable.

Defaults

Distribution Cable Structure Fractions				
Density Zone	**Aerial/Block Cable**	**Buried Cable**	**Underground Cable (calculated)**	**Buried Fraction Available for Shift**
0-5	.25	.75	*0*	*.75*
5-100	.25	.75	*0*	*.75*
100-200	.25	.75	*0*	*.75*
200-650	.30	.70	*0*	*.75*
650-850	.30	.70	*0*	*.75*
850-2,550	.30	.70	*0*	*.75*
2,550-5,000	.30	.65	*.05*	*.75*
5,000-10,000	.60	.35	*.05*	*0*
10,000+	.85	.05	*.10*	*0*

CABLE SIZING FACTORS AND POLE SPACING

B18. Distribution Cable Sizing Factors

Definition

The factor by which distribution cable is increased above the size needed to serve a given quantity of demand in order to provide spare pairs for breakage, line administration, and some amount of growth. HM 5.0a divides the number of pairs needed in a distribution cable to meet existing demand by this factor to determine the minimum number of pairs required, then uses the next larger available size cable.

Default Values

Distribution Cable Sizing Factors	
Density Zone	**Factors**
0-5	.50
5-100	.55
100-200	.55
200-650	.60
650-850	.65
850-2,550	.70
2,550-5,000	.75
5,000-10,000	.75
10,000+	.75

B19. Distribution Pole Spacing

Definition

Spacing between poles supporting aerial distribution cable. HM 5.0a assumes Aerial Cable in the two densest zones is Block and Building Cable, not support on poles.

Default Values

Distribution Pole Spacing	
Density Zone	**Spacing**
0-5	250
5-100	250
100-200	200
200-650	200
650-850	175
850-2,550	175
2,550-5,000	150
5,000-10,000	N/A
10,000+	N/A

GEOLOGY AND CLUSTERS

B20. Distribution Multiplier, Difficult Terrain

Definition

The amount of extra distance required to route distribution and feeder cable around difficult soil conditions, expressed as a multiplier of the distance calculated for normal situations.

Default

1.0

B21. Rock Depth Threshold, inches

Definition

The depth of bedrock, above which (that is, closer to the surface) additional costs are incurred for placing distribution or feeder cable.

Default

24 inches

B22. Hard Rock Placement Multiplier

Definition

The increased cost required to place distribution or feeder cable in bedrock classified as hard, when it is within the rock depth threshold of the surface, expressed as a multiplier of normal installation cost per foot.

Default

3.5

B23. Soft Rock Placement Multiplier

Definition

The increased cost required to place distribution or feeder cable in bedrock classified as soft, when it is within the rock depth threshold of the surface, expressed as a multiplier of normal installation cost per foot.

Default

2.0

B24. Sidewalk / Street Fraction

Definition

The fraction of small, urban clusters that are streets and sidewalks, used in the comparison of cluster area with number of lines to identify cases where high rise buildings are present. To qualify as a small urban cluster, the total land area must be less than .03 square miles and the line density must exceed 30,000 lines per square mile.

Default

0.20

B25. Maximum Analog Copper Total Distance

Definition

The maximum total copper cable length that is allowed to carry voiceband analog signals. When the potential copper cable length exceeds this threshold, it triggers long loop treatment and/or the deeper penetration of fiber based DLC.

Default

18,000 ft.

B26. Feeder steering enable

Definition

An option that, if enabled, instructs the model to adjust each main feeder route direction toward the preponderance of clusters in a quadrant. In the default state, feeder route directions from the wire center are North, East, South, and West.

Default

The default setting is disabled.

B27. Main feeder route/air multiplier

Definition

Route-to-air multiplier applied to main feeder distance when feeder steering is enabled to account for routing main feeder cable around obstacles.

Default

1.27

B27a. Require serving areas to be square

Definition

An option that, if enabled, instructs the model to treat all main clusters as square. In the default state, main clusters are computed as rectangular, with the height to width ratio determined by the process that produces the cluster input data.

Default

The default setting is disabled.

LONG LOOP INVESTMENTS

B28. T1 Repeater Investment, Installed

Definition

The investment per T1 repeater, including electronics, housing, and installation, used for T1 carrier long loop extensions.

Default

$527.00

B29. CO Mux Capacity, installed

Definition

The installed central office multiplexer investment required per road cable used for T1 carrier long loop extensions.

Default

$420.00

B30. Remote Terminal Cabinet and Common Equipment, Installed

Definition

The installed investment per T1 RT used for T1 carrier long loop extensions.

Default

$8,200.00

B31. T1 Channel Unit Investment per Subscriber

Definition

The investment per line in POTS channel units installed in T1 RT used for T1 carrier long loop extensions.

Default

$125.00

B32. Transceiver Investment per RT, Installed

Definition

The installed investment for the transceiver plug-in per T1 RT used to interface with the T1 carrier and to power the repeaters.

Default

$1,170.00

B33. T1 Remote terminal fill factor

Definition

The line unit fill factor in a T1 remote terminal; that is, the ratio of lines served by a T1 remote terminal to the number of line units equipped in the remote terminal.

Default

0.90

B34. Maximum T1s per cable

Definition

Maximum number of T1s that can share a cable without binder group separation or internal shielding.

Default

8

B35. T1 repeater spacing

Definition

Minimum design separation, measured in decibels, on copper cable as a function of the maximum loss between adjacent repeaters at 772 kHz, and the loss of the copper cable on which the repeaters are installed. Used for T1 carrier long loop extensions.

Default

32.0 dB

B36. Aerial T1 Attenuation

Definition

The copper cable attenuation for the design of T1 circuits at an operational frequency of 772 kHz and a maximum temperature of 140 degrees Fahrenheit. Based on air core PIC (Plastic Insulated Conductor) cable.

Default

6.3 dB/kft.

B37. Buried T1 Attenuation

Definition

The copper cable attenuation for the design of T1 circuits at an operational frequency of 772 kHz and at normal operating temperature. Based on water blocking compound filled cables, using solid PIC insulation.

Default

5.0 dB/kft.

SERVING AREA INTERFACE INVESTMENT

B38. Serving Area Interface (SAI) Investment

Definition

The installed investment in the SAI that acts as the physical interface point between distribution and feeder cable.

Default Values

SAI Investment		
SAI Size	**Indoor SAI**	**Outdoor SAI**
7200	$9,656	$10,000
5400	$7,392	$8,200
3600	$4,928	$6,000
2400	$3,352	$4,300
1800	$2,464	$3,400
1200	$1,776	$2,400
900	$1,232	$1,900
600	$888	$1,400
400	$592	$1,000
200	$296	$600
100	$148	$350
50	$98	$250

DEDICATED CIRCUIT INPUTS

B39. Percentage of Dedicated Circuits

Definition

The fractions of total circuits included in the count of total private line and special access circuits that are DS-0 and DS-1 circuits, respectively. The fraction of DS-3 and higher capacity circuits is calculated by the model as (1 - fraction DS0 - fraction DS1). The equivalence between the three circuit types -- that is, DS-0, DS-1, and DS-3 -- and wire pairs is expressed by Parameter B36. Note that the model assumes the circuit counts are expressed in terms of the number of DS-0, DS-1, and DS-3, circuits, respectively, not voice grade circuits or DS-0 equivalents. Thus if the data source expresses all circuit counts as DS-0 equivalents, as is the case with the existing ARMIS 43-08 report used as the source of special access line counts, the values for this parameter should be set to 100% DS-0 and 0% DS-1.

Default

Percentage of Dedicated Circuits	
DS-0	**DS-1**
100%	0%

B40. Pairs per Dedicated Circuit

Definition

Factor expressing the number of wire pairs required per dedicated circuit classification.

Default

Pairs per Dedicated Circuit		
DS-0	DS-1	DS-3
1	2	56

WIRELESS INVESTMENT

B41. Wireless Investment Cap Enable

Definition

When enabled, invokes wireless investment cap for distribution plant investment calculations. In the default mode, the model does not impose the wireless cap.

Default

The default setting is disabled.

B42. Wireless Point to Point Investment Cap – Distribution

Definition

Per-subscriber investment for hypothetical point to point subscriber radio equipment.

Default

$7,500

B43. Wireless Common Investment

Definition

Base Station Equipment investment for hypothetical broadcast wireless loop system.

Default

$112,500

B44. Wireless Per Line Investment

Definition

Per-subscriber investment for hypothetical broadcast wireless loop systems, including customer premises equipment and per subscriber share of base station radios.

Default

$500

B45. Maximum Broadcast Lines per Common Investment

Definition

Capacity of hypothetical base station common equipment, in lines.

Default

30

FEEDER INPUT PARAMETERS

COPPER PLACEMENT

B46. Copper Feeder Structure Fractions

Definition

The relative amounts of different structure types supporting sheath feet of copper feeder cable in each density zone. Aerial feeder cable is attached to telephone poles, buried cable is laid directly in the earth, and underground cable runs through underground conduit.

Default Values

Copper Feeder Structure Fractions			
Density Zone	**Aerial/Block Cable**	**Buried Cable**	**Underground Cable (calculated)**
0-5	.50	.45	*.05*
5-100	.50	.45	*.05*
100-200	.50	.45	*.05*
200-650	.40	.40	*.20*
650-850	.30	.30	*.40*
850-2,550	.20	.20	*.60*
2,550-5,000	.15	.10	*.75*
5,000-10,000	.10	.05	*.85*
10,000+	.05	.05	*.90*

**Note: Buried Fraction Available for Shift for Copper Feeder Structure Fractions is taken from the Buried Fraction Available for Shift for Fiber Feeder Structure Fractions.*

B47. Copper Feeder Manhole Spacing, feet

Definition

The distance, in feet, between manholes for copper feeder cable.

Default Values

Copper Feeder Manhole Spacing, feet	
Density Zone	**Distance between manholes, ft.**
0-5	800
5-100	800
100-200	800
200-650	800
650-850	600
850-2,550	600
2,550-5,000	600
5,000-10,000	400
10,000+	400

B48. Copper Feeder Pole Spacing, feet

Definition

Spacing between poles supporting aerial copper feeder cable.

Default Values

Copper Feeder Pole Spacing	
Density Zone	**Spacing, ft.**
0-5	250
5-100	250
100-200	200
200-650	200
650-850	175
850-2,550	175
2,550-5,000	150
5,000-10,000	150
10,000+	150

B49. Copper Feeder Pole Investment

Definition

The installed cost of a 40’ Class 4 treated southern pine pole.

Default Value

Pole Investment	
Materials	$201
Labor	$216
Total	*$417*

B50. Inner Duct Material Investment per foot

Definition

Material cost per foot of inner duct.

Default Value

$0.30

FIBER PLACEMENT

B51. Fiber Feeder Structure Fractions

Definition

The relative amounts of different structure types supporting fiber feeder cable in each density zone. Aerial feeder cable is attached to telephone poles, buried cable is laid directly in the earth, and underground cable runs through underground conduit.

Default Values

Fiber Feeder Structure Fractions				
Density Zone	**Aerial/Block Cable**	**Buried Cable**	**Underground Cable (calculated)**	**Fraction of Buried Available for Shift**
0-5	.35	.60	*.05*	*.75*
5-100	.35	.60	*.05*	*.75*
100-200	.35	.60	*.05*	*.75*
200-650	.30	.60	*.10*	*.75*
650-850	.30	.30	*.40*	*.75*
850-2,550	.20	.20	*.60*	*.75*
2,550-5,000	.15	.10	*.75*	*.75*
5,000-10,000	.10	.05	*.85*	*.75*
10,000+	.05	.05	*.90*	*.75*

B52. Fiber Feeder Pullbox Spacing, feet

Definition

The distance, in feet, between pullboxes for underground fiber feeder cable.

Default Values

Fiber Feeder Pullbox Spacing, feet	
Density Zone	**Distance between pullboxes, ft.**
0-5	2,000
5-100	2,000
100-200	2,000
200-650	2,000
650-850	2,000
850-2,550	2,000
2,550-5,000	2,000
5,000-10,000	2,000
10,000+	2,000

B53. Buried Fiber Sheath Addition, per foot

Definition

The cost of dual sheathing for additional mechanical protection of buried fiber feeder cable.

Default Value

$0.20/foot

SIZING FACTORS

B54. Copper Feeder Cable Sizing Factors

Definition

The factor by which copper feeder cable capacity is increased above the size needed to serve a given quantity of demand in order to provide spare pairs for breakage, line administration, and some amount of growth. Calculated as the ratio of the number of assigned pairs to the total number of available pairs in the cable.

Default Values

Copper Feeder Cable Sizing Factors	
Density Zone	**Factors**

0-5	.65
5-100	.75
100-200	.80
200-650	.80
650-850	.80
850-2,550	.80
2,550-5,000	.80
5,000-10,000	.80
10,000+	.80

B55. Fiber Feeder Cable Sizing Factor

Definition

Percentage of fiber strands in a cable that is available to be utilized.

Default

Fiber Feeder Cable Sizing Factor	
Density Zone	**Factor**
0-5	1.00
5-100	1.00
100-200	1.00
200-650	1.00
650-850	1.00
850-2,550	1.00
2,550-5,000	1.00
5,000-10,000	1.00
10,000+	1.00

CABLE COSTS

B56. Copper Feeder Cable; $/ foot, per pair-foot

Definition

The cost per foot ($/foot) and per pair-foot of copper feeder cable, as a function of cable size, including the costs of engineering, installation, and delivery, as well as the cable material itself. The copper investment per pair-foot is used in estimating comparative life-cycle costs for copper feeder.

Default Value

Copper Feeder Investment	
Cable Size	**$/foot (u/g & aerial)**
4200	$29.00
3600	$26.00
3000	$23.00
2400	$20.00
1800	$16.00
1200	$12.00
900	$10.00
600	$7.75
400	$6.00
200	$4.25
100	$2.50
Copper Investment per Pair – foot	
$ 0.0075 / pair-ft.	

B57. Fiber Feeder Cable; $/foot, per strand-foot

Definition

The cost per foot ($/foot) and per strand-foot of fiber feeder cable, as a function of cable size, including the costs of engineering, installation, and delivery, as well as the cable material itself. The fiber investment per strand-foot is used in estimating comparative life-cycle costs for copper and fiber feeder.

Default Value

Fiber Feeder Investment	
Cable Size	**$/foot (u/g & aerial)**
216	$13.10
144	$9.50
96	$7.10
72	$5.90
60	$5.30
48	$4.70
36	$4.10
24	$3.50
18	$3.20
12	$2.90
Fiber Investment per Strand – foot	
$ 0.10 / fiber-ft.	

DIGITAL LOOP CARRIER EQUIPMENT

B58. DLC site and power per remote terminal

Definition

The investment associated with site and power for the remote terminal of a Digital Loop Carrier (DLC) system.

Default Value

Remote Terminal Site and Power	
High Density DLC	**Low Density DLC**
$3,000	$1,300

B59. Maximum Line Size per Remote Terminal

Definition

The maximum number of lines supported by the initial line module of a remote terminal.

Default

Maximum Line Increment per Remote Terminal	
High Density DLC	**Low Density DLC**
672	120

B60. Remote terminal sizing factor

Definition

The line unit sizing factor in a DLC remote terminal, that is, the; the ratio of lines served by a DLC remote terminal to the number of line units equipped in the remote terminal.

Default Value

Remote Terminal Sizing Factors	
High Density DLC	**Low Density DLC**
0.90	0.90

B61. DLC initial common equipment investment

Definition

The cost of all common equipment and housing in the remote terminal, as well as the fiber optics multiplexer required at the CO end for the initial line module of the DLC system (assumes integrated digital loop carrier (IDLC) with a GR-303 interface to the local digital switch).

Default Value

Remote Terminal Initial Common Equipment Investment	
High Density DLC	**Low Density DLC**
$66,000	$16,000

B62. DLC channel unit investment

Definition

The investment in channel units required in the remote terminal of the DLC system.

Default Value

DLC Type	DLC channel unit investment per unit	
	POTS Channel Unit	**Coin Channel Unit**
High Density	$310	$250
Low Density	$600	$600

B63. DLC Lines per CU

Definition

The number of lines that can be supported on a single DLC channel unit.

Default Value

DLC Type	DLC Lines per channel unit	
	POTS	**Coin**
High Density	4	2
Low Density	6	6

B64. Low Density DLC to High Density DLC Cutover

Definition

The threshold number of lines served, above which the High Density DLC will be utilized.

Default

B65. Fibers per remote terminal

Definition

The number of fibers connected to each DLC remote terminal.

Default Value

Fibers per Remote Terminal	
High Density DLC	**Low density DLC**
4	4

B66. Optical Patch Panel

Definition

The investment required for each optical patch panel associated with a DLC remote terminal.

Default

Optical Patch Panel	
High Density DLC	**Low density DLC**
$1000	$1000

B67. Copper Feeder Maximum Distance, feet

Definition

The feeder length above which fiber feeder cable is used in lieu of copper cable. The value must be less than 18,000 feet.

Default Value

9,000 feet

B68. Common Equipment Investment per Additional Line Increment

Definition

The cost of the common equipment required for each additional line module in a remote terminal.

Default

Common Equipment Investment per Additional Line Increment	
High Density	**Low Density**
672 Lines	**120 Lines**
$18,500	$9,400

B69. Maximum Number of Additional Line Modules per Remote Terminal

Definition

The number of line modules (in increments of 672 or 120 lines) that can be added to a remote terminal.

Default

Max. # Add. Line Modules/RT	
High Density DLC	**Low density DLC**
2	1

COPPER MANHOLE INVESTMENT

B70. Manhole Investment, materials and labor

Definition

The installed cost of a prefabricated concrete manhole, including backfill and restoration. All the non-italicized costs in the following table are separately adjustable.

Default Value

Copper Cable Manhole Investment						
Density Zone	**Materials**	**Frame & Cover**	**Site Delivery**	**Total Material**	**Excavation & Backfill**	**Total Installed Manhole**
0-5	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
5-100	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
100-200	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
200-650	$1,865	$350	$125	*$2,340*	$2,800	*$5,140*
650-850	$1,865	$350	$125	*$2,340*	$3,200	*$5,540*
850-2,550	$1,865	$350	$125	*$2,340*	$3,500	*$5,840*
2,550-5,000	$1,865	$350	$125	*$2,340*	$3,500	*$5,840*
5,000-10,000	$1,865	$350	$125	*$2,340*	$5,000	*$7,340*
10,000+	$1,865	$350	$125	*$2,340*	$5,000	*$7,340*

B71. Dewatering factor for manhole placement

Definition

Fractional increase in manhole placement to reflect additional cost required to install manholes in presence of shallow water table.

Default

0.20

B72. Water table depth for dewatering

Definition

Water table depth at which dewatering factor is invoked.

Default

5.00 feet

FIBER PULLBOX INVESTMENT

B73. Fiber Feeder Pullbox Investment

Definition

The investment per fiber pullbox in the feeder portion of the network.

Default Values

Fiber Pullbox Investment		
Density Zone	**Pullbox Materials**	**Pullbox Installation**
0-5	$280	$220
5-100	$280	$220
100-200	$280	$220
200-650	$280	$220
650-850	$280	$220
850-2,550	$280	$220
2,550-5,000	$280	$220
5,000-10,000	$280	$220
10,000+	$280	$220

SWITCHING AND INTEROFFICE TRANSMISSION PARAMETERS

END OFFICE SWITCHING

B74. Switch real-time limit, busy hour call attempts

Definition

The maximum number of busy hour call attempts (BHCA) a switch can handle. If the model determines that the load on a processor, calculated as the number of busy hour call attempts times the processor feature load multiplier, would exceed the switch real time limit multiplied by the switch maximum processor occupancy, it will add a switch to the wire center.

Default Values

Switch Real-time limit, BHCA	
Lines Served	**BHCA**
1-1,000	10,000
1,000-10,000	50,000
10,000-40,000	200,000
40,000+	600,000

B75. Switch traffic limit, BHCCS

Definition

The maximum amount of traffic, measured in hundreds of call seconds (CCS), the switch can carry in the busy hour (BH). If the model determines that the offered traffic load on an end office switching network exceeds the traffic limit, it will add a switch.

Default Value

Lines	Busy Hour CCS
1-1,000	30,000
1,000-10,000	150,000
10,000-40,000	600,000
40,000+	1,800,000

B76. Switch maximum equipped line size

Definition

The maximum number of lines plus trunk ports that a typical digital switching machine can support.

Default Value

80,000

B77. Switch port administrative fill

Definition

The percent of lines in a switch that are assigned to subscribers compared to the total equipped lines in a switch.

Default Value

0.98

B78. Switch maximum processor occupancy

Definition

The fraction of total capacity (measured in busy hour call attempts, BHCA) an end office switch is allowed to carry before the model adds another switch.

Default Value

0.90

B79. MDF/Protector Investment per Line

Definition

The Main Distribution Frame investment, including protector, required to terminate one line.

Default Value

$12.00

B80. Analog Line Circuit Offset for DLC lines, per line

Definition

The reduction in per line switch investment resulting from the fact that line cards are not required in both the switch and remote terminal for DLC-served lines.

Default Value

$5.00

B81. Switch installation multiplier

Definition

Definition: The telephone company investment in switch engineering and installation activities, expressed as a multiplier of the switch investment.

Default Value

1.10

B82. End Office Switching Investment Constant Term

Definition

The value of the constant ("B") appearing in the function that calculates the per line switching investment as a function of switch line size for an amalgam of host-remote and stand alone switches, expressed separately for BOCs and large independents (ICOs), on the one hand, and for small ICOs, on the other hand. The function is cost per line = A *ln* X + B, where X is the number of lines.

Default Values

BOC and Large ICO	Small ICO
$242.73	$416.11

B83. End Office Switching Investment Slope Term

Definition

The constant multiplying the log function appearing in the EO switching investment function ("A" in the function shown in parameter 4.1.9.) that calculates the per line switching investment as a function of switch line size for an amalgam of host-remote and stand alone switches. This term is the same for BOCs, large independents, and small independents.

Default Value

-14.922

B84. Processor feature loading multiplier

Definition

The amount by which the load on a processor exceeds the load associated with ordinary telephone calls, due to the presence of vertical features, Centrex, etc., expressed as a multiplier of nominal load.

Default Value

The default value is 1.20 for business line percentage up to the variable business penetration rate, increasing linearly above that rate to a final value of 2.00 for 100% business lines.

B85. Business Penetration Ratio

Definition

The percentage of business lines to total line at which the processor feature loading multiplier is assumed to reach the "heavy business" value of 2.

Default Value

0.30

WIRE CENTER

B86. Lot size, multiplier of switch room size

Definition

The multiplier of switch room size to arrive at total lot size to accommodate building and parking requirements.

Default Value

2

B87. Tandem/EO wire center common factor

Definition

The percentage of tandem switches that are also end office switches or are collocated in wire centers with end office switches. This accounts for the fact that tandems and end offices are often located together, and is employed to avoid double counting of land and other wire center investment in these instances.

Default Value

0.4

B88. Power investment

Definition

The wire center investment required for rectifiers, battery strings, back-up generators and various distributing frames, as a function of switch line size.

Default Value

Lines	Investment Required
0	$5,000
1000	$10,000
5000	$20,000
25,000	$50,000
50,000	$250,000

B89. Switch room size

Definition

The area in square feet required to house a switch and its related equipment.

Default Value

Switch Room Size	
Lines	Sq. Feet of Floor Space Required
0	500
1,000	1,000
5,000	2,000
25,000	5,000
50,000	10,000

B90. Construction costs, per sq. ft.

Definition

The costs of construction of a wire center building.

Default Value

Construction Costs per sq. ft.	
Lines	Cost/sq. ft.
0	$75
1,000	$85
5,000	$100
25,000	$125
50,000	$150

B91. Land price, per sq. ft.

Definition

The land price associated with a wire center.

Default Value

Lines	Price/sq. ft.
0	$5.00
1,000	$7.50
5,000	$10.00
25,000	$15.00
50,000	$20.00

TRAFFIC PARAMETERS

B92. Local Call Attempts

Definition

The number of yearly local call attempts, as reported to the FCC.

Default Value

Taken from ARMIS reports for the LEC being studied.

B93. Call Completion Fraction

Definition

The percentage of call attempts that result in a completed call. Calls that result in a busy signal, no answer, or network blockage are all considered incomplete.

Default Value

0.7

B94. IntraLATA Calls Completed

Definition

The number of yearly intraLATA call attempts, as reported by the FCC.

Default Value

Taken from ARMIS reports for the LEC being studied.

B95. InterLATA Intrastate Calls Completed

Definition

The number of yearly interLATA intrastate call attempts, as reported to the FCC.

Default Value

Taken from ARMIS reports for the LEC being studied.

B96. InterLATA Interstate Calls Completed

Definition

The number of yearly interLATA interstate call attempts, as reported to the FCC.

Default Value

Taken from ARMIS reports for the LEC being studied.

B97. Local DEMs, thousands

Definition

The number of yearly local DEMs, as reported to the FCC.

Default Value

Taken from ARMIS reports for the LEC being studied.

B98. Intrastate DEMs, thousands

Definition

The number of yearly intrastate DEMs, as reported to the FCC.

Default Value

Taken from ARMIS reports for the LEC being studied.

B99. Interstate DEMs, thousands

Definition

The number of yearly interstate DEMs, as reported to the FCC.

Default Value

Taken from ARMIS reports for the LEC being studied.

B100. Local bus/res DEMs ratio

Definition

The ratio of local Business DEMs per line to local Residential DEMs per line.

Default Value

1.1

B101. Intrastate bus/res DEMs

Definition

The ratio of intrastate Business DEMs per line to intrastate Residential DEMs per line.

Default Value

2

B102. Interstate bus/res DEMs

Definition

The ratio of interstate Business DEMs per line to interstate Residential DEMs per line.

Default Value

3

B103. Busy hour fraction of daily usage

Definition

The percentage of daily usage that occurs during the busy hour.

Default Value

0.10

B104. Annual to daily usage reduction factor

Definition

The effective number of business days in a year, used to concentrate annual usage into a fewer number of days as a step in determining busy hour usage.

Default Value

270

B105. Holding time multipliers, residential/business

Definition

The potential modification to the average call "holding time" (i.e., duration) to reflect Internet use or other causes, expressed as a multiplier of the holding time associated with ordinary residential or business telephone calls.

Default Value

Holding time multipliers	
Residential	**Business**
1.0	1.0

B106. Call attempts, Busy Hour (BHCA), residential/business

Definition

The number of call attempts originated per residential and business subscriber during the busy hour.

Default Value

Busy Hour Call Attempts	
Residential	Business
1.3	3.5

INTEROFFICE INVESTMENT

B107. Transmission Terminal Investment

Definition

The investment in 1) the fully-equipped add-drop multiplexer (ADM) that extracts/inserts signals into OC-48 or OC-3 fiber rings, and are needed in each wire center to connect the wire center to the interoffice fiber ring; and 2) the fully-equipped OC-3/DS-1 terminal multiplexers required to interface to the OC-48 ADM and to provide point to point circuits between on-ring wire centers and end offices not connected directly to a fiber ring. The "Investment per 7 DS-1" figure is the amount by which the investment in OC-3s is reduced for each unit of 7 DS-1s below full capacity of the OC-3.

Default Value

Transmission Terminal Investment			
OC-48 ADM, Installed		OC-3/DS-1 ADM/Terminal Multiplexer, Installed	Investment per 7 DS-1s
48 DS-3s	12 DS-3s	84 DS-1s	7 DS-1s
$50,000	$40,000	$26,000	$500

B108. Number of fibers

Definition

The assumed fiber cross-section, or number of fibers in a cable, in an interoffice fiber ring and point to point connection.

Default Value

24

B109. Pigtail Investment

Definition

The cost of the short fiber connectors that attach the interoffice ring fibers to the wire center transmission equipment via a patch panel.

Default Value

$60.00 per pigtail

B110. Optical Distribution Panel

Definition

The cost of the physical fiber patch panel used to connect 24 fibers to the transmission equipment.

Default Value

$1,000.00

B111. EF&I, per hour

Definition

The per-hour cost for the "engineered, furnished, and installed" activities for equipment in each wire center associated with the interoffice fiber ring, such as the "pigtails" and patch panels to which the transmission equipment is connected.

Default Value

$55.00

B112. EF&I, units

Definition

The number of hours required to install the equipment associated with the interoffice transmission system (see EF&I, per hour, above).

Default Value

32 hours

B113. Regenerator investment, installed

Definition

The installed cost of an OC-48 optical regenerator.

Default Value

$15,000

B114. Regenerator spacing, miles

Definition

The distance between digital signal regenerators in the interoffice fiber optics transmission system.

Default Value

40 miles

B115. Channel Bank Investment, per 24 lines

Definition

The investment in voice grade to DS-1 multiplexers in wire centers required for some special access circuits.

Default Value

$5,000

B116. Fraction of SA Lines Requiring Multiplexing

Definition

The percentage of special access circuits that require DS-0 to DS-1 multiplexing in the wire center in order to be carried on the interoffice transmission system. This parameter is for use in conjunction with a study of the cost of special access circuits.

Default Value

0.0

B117. Digital Cross Connect System, Installed, per DS-3

Definition

The investment required for a digital cross connect system that interfaces DS-1 signals between switches and OC-3 multiplexers, expressed on a per DS-3 basis (672 DS-0).

Default Value

$30,000

B118. Transmission Terminal Fill (DS-0 level)

Definition

The fraction of maximum DS-0 circuit capacity that can actually be utilized in ADMs, DS-1 to OC-3 multiplexers, and channel banks.

Default Value

0.90

B119. Interoffice Fiber Cable investment per foot, installed

Definition

The installed cost per foot of interoffice fiber cable, assuming a 24-fiber cable.

Default Value

$3.50 installed and buried

B120. Number of Strands per ADM

Definition

The number of interoffice fiber strands connected to the ADM in each wire center. At least four strands per ADM are required around the ring.

Default Value

4

B121. Interoffice Structure Percentages

Definition

The relative amounts of different structure types supporting interoffice transmission facilities. Aerial cable is attached to telephone poles or buildings, buried cable is laid directly in the earth, and underground cable runs through underground conduit. Aerial and buried percentages are entered by the user; the underground fraction is then computed.

Default Values

Structure Percentages		
Aerial	**Buried**	**Underground**
20%	60%	*20%*

B122. Transport Placement

Definition

The cost of placement of fiber cable used in the interoffice transmission system.

Default Values

Transport Placement, per foot	
Buried	**Conduit**
$1.77	$16.40

B123. Buried Sheath Addition

Definition

The cost of dual sheathing for additional mechanical protection of fiber interoffice transport cable.

Default Value

$0.20/foot

B124. Interoffice conduit, cost and number of tubes

Definition

The cost per foot for interoffice fiber cable conduit, and the number of spare tubes (conduit) placed per

route.

Default Values

Cost per foot	Spare tubes per route
$0.60	1

B125. Pullbox Spacing

Definition

Spacing between pullboxes in the interoffice portion of the network.

Default Value

2,000 feet

B126. Pullbox Investment

Definition

Investment per fiber pullbox in the interoffice portion of the network.

Default Value

$500

B127. Pole Spacing, Interoffice

Definition

Spacing between poles supporting aerial interoffice fiber cable.

Default Value

150 feet

B128. Interoffice pole material and labor

Definition

The installed cost of a 40’ Class 4 treated southern pine pole.

Default Value

Pole Investment	
Materials	$201
Labor	$216
Total	*$417*

B129. Fraction Interoffice Structure Common With Feeder

Definition

The percentage of structure supporting interoffice transport facilities that is also shared by feeder facilities, expressed as a fraction of the smaller of the interoffice and feeder investment for each of the three types of facilities (i.e., aerial, buried and underground are considered separately in calculating the amount of sharing).

Default

0.75

B130. Fraction of interoffice structure assigned to telephone

Definition

The fraction of investment in interoffice poles and trenching that is assigned to LECs. The remainder is attributed to other utilities/carriers

Default Value

Fraction of Interoffice Structure Assigned to Telephone		
Aerial	**Buried**	**Underground**
0.33	0.33	0.33

TRANSMISSION PARAMETERS

B131. Operator traffic fraction

Definition

Fraction of traffic that requires operator assistance. This assistance can be automated or manual (see Operator Intervention Fraction in the Operator Systems section below)

Default

0.02

B132. Total interoffice traffic fraction

Definition

The fraction of all calls that are completed on a switch other than the originating switch, as opposed to calls completed within a single switch.

Default

0.65

B133. Maximum trunk occupancy, CCS

Definition

The maximum utilization of a trunk during the busy hour.

Default

27.5

B134. Trunk port investment, per end

Definition

Per-trunk equivalent investment in switch trunk port at each end of a trunk.

Default

$100

B135. Direct-routed fraction of local inter-office

Definition

The amount of local interoffice traffic that is directly routed between originating and terminating end offices as opposed to being routed via a tandem switch.

Default

0.98

B136. Tandem routed fraction of total intraLATA traffic

Definition

Fraction of intraLATA calls that are routed through a tandem.

Default

0.2

B137. Tandem routed fraction of total interLATA traffic

Definition

Fraction of interLATA (IXC access) calls that are routed through a tandem instead of directly to the IXC.

Default

0.2

B138. POPs per Tandem Location

Definition

The number of IXC points of presence requiring an entrance facility, per LEC tandem.

Default

5

B139. Threshold value for off-ring wire centers

Definition

The treshold value, in lines, that determines whether a wire center should be included in ring calculations and therefore be a candidate to appear on (that is, be directly connected to) a ring. Wire centers whose size falls below the threshold will not be appear on a ring, but will be connected via a point-point link to the tandem switch or via a "spur" to the nearest wire center that is on a ring. Transmission equipment in such cases consists of terminal multiplexers and not ADMs. This parameter only applies to companies that own and operate a local tandem switch.

Default

1 line

B140. Remote - host fraction of interoffice traffic

Definition

Fraction of local direct traffic assumed to flow from a remote to its host switch.

Default

0.10

B141. Host - remote fraction of interoffice traffic

Definition

Fraction of local direct traffic assumed to flow from a host to its remotes.

Default

0.05

B142. Maximum nodes per ring

Definition

Maximum number of ADMs that are permitted on a single ring.

Default

16

B142a. Ring transiting traffic factor

Definition

An estimated factor, representing the fraction of traffic that flows from one ring to another by way of a third, or "transit," ring.

Default

0.40

B142b. Intertandem fraction of tandem trunks

Definition

A factor used to estimate the number of additional trunks required to carry intertandem traffic.

Default

0.10

TANDEM SWITCHING

B143. Real time limit, BHCA

Definition

The maximum number of BHCA a tandem switch can process.

Default

750,000

B144. Port limit, trunks

Definition

The maximum number of trunks that can be terminated on a tandem switch.

Default

100,000

B145. Tandem common equipment investment

Definition

The amount of investment in tandem switch common equipment, which is the hardware and software that is present in the tandem in addition to the trunk terminations themselves. The cost of a tandem is estimated by the HM as the cost of common equipment plus an investment per trunk terminated on the tandem.

Default

$1,000,000

B146. Maximum trunk fill (port occupancy)

Definition

The fraction of the maximum number of trunk ports on a tandem switch that can be utilized.

Default

0.90

B147. Maximum real time tandem occupancy

Definition

The fraction of the total capacity (expresses as the real time limit, BHCA) a tandem switch is allowed to carry before an additional switch is provided.

Default

0.90

B148. Tandem common equipment intercept factor

Definition

The multiplier of the common equipment investment input that gives the common equipment cost for the smallest tandem switch, allowing scaling of tandem switching investment according to trunk requirements.
.

Default

0.50

B149. Entrance Facility Distance from Serving Wire Center & IXC POP

Definition

Average length of trunks connecting an IXC with the wire center that serves it.

Default

0.5 miles

SIGNALING

B150. STP link capacity

Definition

The maximum number of signaling links that can be terminated on a given STP pair.

Default Value

720

B151. STP maximum fill

Definition

The fraction of maximum links, as stated by the STP link capacity input, that the model assumes can be utilized before it adds another STP pair.

Default Value

0.80

B152. STP maximum common equipment investment, per pair

Definition

The cost to purchase and install an STP pair, fully equipped for the maximum number of links.

Default Value

Maximum investment: $5,000,000

B153. STP minimum common equipment investment, per pair

Definition

The minimum investment for a minimum-capacity STP, i.e.: the fixed investment for an STP pair that serves a minimum number of links.

Default Value

$1,000,000

B154. Link termination, both ends

Definition

The investment required for the transmission equipment that terminates both ends of an SS7 signaling link.

Default Value

$900.00

B155. Signaling link bit rate

Definition

The rate at which bits are transmitted over an SS7 signaling link.

Default Value

56,000 bits per second

B156. Link occupancy

Definition

The fraction of the maximum bit rate that can be sustained on an SS7 signaling link.

Default Value

0.40

B157. C link cross-section

Definition

The number of C-links in each segment connecting a mated STP pair.

Default Value

24

B158. ISUP messages per interoffice BHCA

Definition

The number of Integrated Services Digital Network User Part (ISUP) messages associated with each interoffice telephone call attempt, i.e. the messages switches send to each other over the SS7 network to negotiate establishing a voice path.

Default Value

6

B159. ISUP message length, bytes

Definition

The average number of bytes in each ISUP (ISDN User Part) message.

Default Value

25 bytes

B160. TCAP messages per transaction

Definition

The number of Transaction Capabilities Application Part (TCAP) messages required per SCP database query. A TCAP message is a message from a switch to a database or another switch that provides the switch with additional information prior to setting up a call or completing a call.

Default Value

2

B161. TCAP message length, bytes

Definition

The average length of a TCAP message.

Default Value

100 bytes

B162. Fraction of BHCA requiring TCAP

Definition

The percentage of BHCAs that require a database query, and thus generate TCAP messages.

Default Value

0.10

B163. SCP investment per transaction per second

Definition

The investment in the Service Control Point (SCP) associated with database queries, or transactions, stated as the investment required per transaction per second. For example, an SCP required to handle 100 transactions per second would require a 2 million dollar investment, if the default of $20,000 is assumed.

Default Value

$20,000

OS AND PUBLIC TELEPHONE

B164. Investment per operator position

Definition

The investment per computer required for each operator position.

Default Value

$6,400

B165. Maximum utilization per position, CCS

Definition

The estimated maximum number of CCS that one operator position can handle during the busy hour.

Default Value

32

B166. Operator intervention factor

Definition

The percentage of all operator-assisted calls that require operator intervention, expressed as 1 out of every N calls, where N is the value of the input.

Default Value

10

B167. Public Telephone equipment investment per station

Definition

The weighted average cost of a public telephone and pedestal (coin/non-coin and indoor/outdoor).

Default Value

$760

ICO PARAMETERS

B168. ICO STP Investment per Line

Definition

The surrogate value for the per line investment in a signal transfer point by an independent telephone company (ICO), in lieu of calculating it directly in the model.

Default Value

$5.50

B169. Per Line ICO Local Tandem Investment

Definition

The surrogate value for the per line investment in a local tandem switch by an independent telephone company (ICO), in lieu of calculating it directly in the model.

Default Value

$1.90

B170. Per Line ICO OS Tandem Investment

Definition

The surrogate value for the per line investment in an Operator Services tandem switch by an independent telephone company (ICO), in lieu of calculating it directly in the model.

Default Value

$0.80

B171. Per Line ICO SCP Investment

Definition

The surrogate value for the per line investment in a SCP by an independent telephone company (ICO), in lieu of calculating it directly in the model.

Default Value

$2.50

B172. Per Line ICO STP/SCP Wire Center Investment

Definition

The surrogate value for the per line investment in an STP/SCP wire center by an independent telephone company (ICO), in lieu of calculating it directly in the model.

Default Value

$0.40

B173. Per Line ICO Local Tandem Wire Center Investment

Definition

The surrogate value for the per line investment in a local tandem wire center by an independent telephone company (ICO), in lieu of calculating it directly in the model.

Default Value

$2.50

B174. Per Line ICO OS Tandem Wire Center Investment

Definition

The surrogate value for the per line investment in a operator services tandem wire center by an independent telephone company (ICO), in lieu of calculating it directly in the model.

Default Value

$1.00

B175. Per Line ICO C-Link / Tandem A-Link Investment

Definition

The surrogate value for the per line investment in a C-link / tandem A-link by an independent telephone company (ICO), in lieu of calculating it directly in the model.

Default Value

$0.30

B175a. Equivalent Facility Investment per DS0

Definition

The per-DS0 surrogate facilities investment by a small ICO for dedicated circuits between an end office and tandem switch belonging to the BOC (or other large LEC) on which the ICO relies for interoffice connectivity.

Default Value

$138.08

B175b. Equivalent Terminal Investment per DS0

Definition

The per-DS0 surrogate investment by a small ICO for terminal equipment used on dedicated circuits between an end office and tandem switch belonging to the BOC (or other large LEC) on which the ICO relies for interoffice connectivity.

Default Value

$111.62

HOST / REMOTE ASSIGNMENT

B176. Host / remote CLLI assignments

Definition

An input form consisting of parameters that allow the user to specify the set of host and remote wire centers, and establish the relationships between remotes and their serving host, using the CLLI codes of the respective switches. In the default mode, HM 5.0a assumes all switches operate independently, and thus does not include host/remote designations or relationships.

Default Value

Default settings do not define hosts or remotes.

B177. Host / remote assignment enable

Definition

An option that, if enabled, instructs the model to perform switching calculations based on the host-remote relationships defined by Parameter 4.10.1.

Default Value

Default setting is disabled.

HOST / REMOTE INVESTMENT

B177a. Line Size Designation

Definition

The line size designation of fixed and per line investments for standalone, host, and remote switches.

Default Value

Line Size
0
640
5,000
10,000

B177b. Fixed and per Line Investments

Definition

The fixed and per line investments included in the function that calculates the per line switching investment as a function of switch line size for host, remote, and stand alone switches, expressed separately for BOCs and large independents and for small independents. The cost function for each type of switch and each type of telephone company is assumed to have the form A + B * x, where A is the fixed investment, B is the per-line investment, and x is the number of lines.

Default Value

Fixed and per Line Investments for Standalone, Host and Remote Switches						
BOCs and Large ICOs						
Line Size	Standalone fixed investment	Host fixed investment	Remote fixed investment	Standalone per line investment	Host per line investment	Remote per line investment
0	$175,000	$183,750	$10,000	$75	$75	$85
640	$175,000	$183,750	$55,000	$75	$75	$83
5,000	$175,000	$183,750	$70,000	$75	$75	$85
10,000	$475,000	$498,750	$225,000	$73	$73	$70
Small ICOs						
Line Size	Standalone fixed investment	Host fixed investment	Remote fixed investment	Standalone per line investment	Host per line investment	Remote per line investment
0	$300,001	$315,001	$17,143	$129	$129	$146
640	$300,001	$315,001	$94,286	$129	$129	$141
5,000	$300,001	$315,001	$120,000	$129	$129	$146
10,000	$814,289	$855,003	$385,716	$124	$124	$120

EXPENSE

COST OF CAPITAL

B178. Cost of capital

Definition

The capital cost structure, including the debt/equity ratio, cost of debt, and return on equity, that makes up the overall cost of capital.

Default Values

Debt percent	0.450
Cost of debt	0.077
Cost of equity	0.119
Weighted average cost of capital	*0.1001*

DEPRECIATION AND NET SALVAGE

B179. Depreciation Lives and Net Salvage Percentages

Definition

The economic life and net salvage value of various network plant categories.

Default Value

Plant Type	Economic Life	Net Salvage %
motor vehicles	8.24	11.21
garage work equipment	12.22	-10.71
other work equipment	13.04	3.21
buildings	46.93	1.87
furniture	15.92	6.88
office support equipment	10.78	6.91
company comm. Equipment	7.40	3.76
general purpose computers	6.12	3.73
digital electronic switching	16.17	2.97
operator systems	9.41	-0.82
digital circuit equipment	10.24	-1.69
public telephone term. Equipment	7.60	7.97
Poles	30.25	-89.98
aerial cable, metallic	20.61	-23.03
aerial cable, non metallic	26.14	-17.53
underground cable, metallic	25.00	-18.26
underground cable, non metallic	26.45	-14.58
buried cable, metallic	21.57	-8.39
buried cable, non metallic	25.91	-8.58
intrabuilding cable, metallic	18.18	-15.74
intrabuilding cable, non metallic	26.11	-10.52
conduit systems	56.19	-10.34

EXPENSE ASIGNMENT

B179a. Expense Assignment

Definition

The fraction of certain categories of indirect expenses, including the loop component of general support, as well as network operations, other taxes, and variable overhead, that are assigned to loop UNEs (distribution, concentrator, feeder and NID), and thus to universal service, on a per-line basis, rather than the default assignment based on the relative proportions of the direct costs associated with these UNEs.

Default Value

Expense Assignment	Percent to be assigned per line
General Support Loops	
Furniture – Capital Costs	0 %
Furniture – Expenses	0 %
Office Equipment – Capital Costs	0 %
Office Equipment – Expenses	0 %
General Purpose Computer – Capital Costs	0 %
General Purpose Computer – Expenses	0 %
Motor Vehicles – Capital Costs	0 %
Motor Vehicles – Expenses	0 %
Buildings – Capital Costs	0 %
Buildings – Expenses	0 %
Garage Work Equipment – Capital Costs	0 %
Garage Work Equipment – Expenses	0 %
Other Work Equipment – Capital Costs	0 %
Other Work Equipment – Expenses	0 %
Network Operations	0 %
Other Taxes	0 %
Variable Overhead	0 %

STRUCTURE FRACTION ASSIGNED TO TELEPHONE

B180. Structure Percentage Assigned to Telephone Company

Definition

The fraction of investment in distribution and feeder poles and trenching that is assigned to LECs. The remainder is attributed to other utilities/carriers.

Default Values

Structure Percent Assigned to Telephone Company						
	Distribution			Feeder		
Density Zone	Aerial	Buried	Underground	Aerial	Buried	Underground
0-5	.50	.33	1.00	.50	.40	.50
5-100	.33	.33	.50	.33	.40	.50
100-200	.25	.33	.50	.25	.40	.40
200-650	.25	.33	.50	.25	.40	.33
650-850	.25	.33	.40	.25	.40	.33
850-2,550	.25	.33	.33	.25	.40	.33
2,550-5,000	.25	.33	.33	.25	.40	.33
5,000-10,000	.25	.33	.33	.25	.40	.33
10,000+	.25	.33	.33	.25	.40	.33

OTHER

B181. Income tax rate

Definition

The combined federal and state income tax rate on earnings paid by a telephone company.

Default Value

39.25%

B182. Variable overhead factor

Definition

Forward-looking corporate overhead costs, expressed as a fraction of the sum of all capital costs and operations expenses calculated by the model.

Default Value

10.4%

B183. Other taxes factor

Definition

Operating taxes (primarily gross receipts and property taxes) paid by a telephone company in addition to federal and state income taxes.

Default Value

5%

B184. Billing/bill inquiry per line per month

Definition

The cost of bill generation and billing inquiries for end users, expressed as an amount per line per month.

Default Value

$1.22

B185. Directory listing per line per month

Definition

The monthly cost of creating and maintaining white pages listings on a per line, per month basis that is to be eligible for universal service support.

Default Value

$0.00

B186. Forward-looking network operations factor

Definition

The forward-looking factor applied to a specific category of expenses reported in ARMIS called Network Operations. The factor is expressed as the percentage of current ARMIS-reported Network Operations.

Default Value

50%

B187. Alternative Central office switching expense factor

Definition

The expense to investment ratio for digital switching equipment, used as an alternative to the ARMIS expense ratio, reflecting forward looking rather than embedded costs. Thus, this factor multiplies the calculated investment in digital switching in order to determine the monthly expense associated with digital switching. This factor is not intended to capture the cost of software upgrades to the switch, as all switching software is part of the capital value inputs to HM 5.0a.

Default Value

2.69%

B188. Alternative circuit equipment factor

Definition

The expense to investment ratio for all circuit equipment (as categorized by LECs in their ARMIS reports), used as an alternative to the ARMIS expense ratio to reflect forward looking rather than embedded costs.

Default Value

0.0153

B189. End office non line-port cost fraction

Definition

The fraction of the total investment in digital switching that is assumed to be not related to the connection of lines to the switch.

Default Value

70%

B190. Per-line monthly LNP cost

Definition

The estimated cost of permanent Local Number Portability (LNP), expressed on a per-line, per-month basis, including the costs of implementing and maintaining the service. This is included in the USF calculations only, not the UNE rates, because it will be included in the definition of universal service once the service is implemented.

Default Value

$0.25

B191. Carrier-carrier customer service per line

Definition

The yearly amount of customer operations expense associated with the provision of unbundled network elements by the LECs to carriers who purchase those elements.

Default Value

$1.69

B192. NID expense per line per year

Definition

The estimated annual NID expense on a per line basis, based on an analysis of ARMIS data modified to reflect forward looking costs. This is for the NID only, not the drop wire, which is included in the ARMIS cable and wire account.

Default Value

$1.00/line/year

B193. DS-0/DS-1 Terminal Factor

Definition

The relative terminal investment per DS-0, between the DS-1 and DS-0 levels.

Default Value

12.4

B194. DS-1/DS-3 Terminal Factor

Definition

The relative investment per DS-0, between the DS-3 and DS-1 levels.

Default

9.9

B195. Average Lines per Business Location

Definition

The average number of business lines per business location, used to calculate NID and drop cost. This parameter should be set the same as B6.

Default

4

B196. Average trunk utilization

Definition

The 24 hour average utilization of an interoffice trunk.

Default Value

0.30

EXCAVATION AND RESTORATION PARAMETERS

B197. Underground Excavation, Cost per Foot

Definition

The cost per foot to dig a trench in connection with building an underground conduit system to facilitate the placement of underground cables. Cutting the surface, placing the 4" PVC conduit pipes, backfilling the trench with appropriately screened fill, and restoring surface conditions is covered in the following section titled, "Underground Restoration Cost per Foot." These two sections do not include the material cost of the PVC conduit pipe, which is covered under "Conduit Material Investment per foot."

Default Value

Underground Excavation Costs per Foot						
Density	Normal Trenching		Backhoe		Hand Trench	
Range	Fraction	Per Foot	Fraction	Per Foot	Fraction	Per Foot
0-5	*54%*	$1.90	45%	$3.00	1%	$5.00
5-100	*54%*	$1.90	45%	$3.00	1%	$5.00
100-200	*54%*	$1.90	45%	$3.00	1%	$5.00
200-650	*52%*	$1.90	45%	$3.00	3%	$5.00
650-850	*52%*	$1.95	45%	$3.00	3%	$5.00
850-2,550	*50%*	$2.15	45%	$3.00	5%	$5.00
2,550-5,000	*35%*	$2.15	55%	$3.00	10%	$5.00
5,000-10,000	*23%*	$6.00	67%	$20.00	10%	$10.00
10,000+	*16%*	$6.00	72%	$30.00	12%	$18.00

Note: Fraction % for Trenching is the fraction remaining after subtracting Backhoe % & Trench %.

B198. Underground Restoration, Cost per Foot

Definition

The cost per foot to cut the surface, place the 4" PVC conduit pipes, backfill the trench with appropriately screened fill, and restore surface conditions. Digging a trench in connection with building an underground conduit system to facilitate the placement of underground cables is covered in the preceding section titled, "Distribution Underground Excavation Cost per Foot." These two sections do not include the material cost of the PVC conduit pipe, which is covered under "Conduit Material Investment per foot."

Default Value

Underground Restoration Costs per Foot												
	Cut/Restore Asphalt		Cut/Restore Concrete		Cut/Restore Sod		Simple Backfill		Conduit Placement & Stabilization			
Density Range	Frac-tion	Per Foot	Frac-tion	Per Foot	Frac-tion	Per Foot	Frac-tion	Per Foot	Frac-tion	Pave-ment/ft	Frac-tion	Dirt/ft
0-5	55%	$6.00	10%	$9.00	1%	$1.00	*34%*	$0.15	*65%*	$5.00	*35%*	$1.00
5-100	55%	$6.00	10%	$9.00	1%	$1.00	*34%*	$0.15	*65%*	$5.00	*35%*	$1.00
100-200	55%	$6.00	10%	$9.00	1%	$1.00	*34%*	$0.15	*65%*	$5.00	*35%*	$1.00
200-650	65%	$6.00	10%	$9.00	3%	$1.00	*22%*	$0.15	*75%*	$5.00	*25%*	$1.00
650-850	70%	$6.00	10%	$9.00	4%	$1.00	*16%*	$0.15	*80%*	$5.00	*20%*	$1.00
850-2,550	75%	$6.00	10%	$9.00	6%	$1.00	*9%*	$0.15	*85%*	$9.00	*15%*	$4.00
2,550-5,000	75%	$6.00	15%	$9.00	4%	$1.00	*6%*	$0.15	*90%*	$13.00	*10%*	$11.00
5,000-10,000	80%	$18.00	15%	$21.00	2%	$1.00	*3%*	$0.15	*95%*	$17.00	*5%*	$12.00
10,000+	82%	$30.00	16%	$36.00	0%	$1.00	*2%*	$0.15	*98%*	$20.00	*2%*	$16.00

Note: Fraction % for Simple Backfill is the fraction remaining after subtracting Asphalt % & Concrete % & Sod %. Fraction % for Conduit Placement & Stabilization for Pavement is Asphalt % + Concrete %. Dirt is Sod % + Simple Backfill %

B199. Buried Excavation, Cost per Foot

Definition

The cost per foot to dig a trench to allow buried placement of cables, or the plowing of one or more cables into the earth using a single or multiple sheath plow.

Default Value

Buried Excavation Costs per Foot												
	Plow		Normal Trench		Backhoe		Hand Trench		Bore Cable		Push Pipe/Pull Cbl	
Density Range	Frac-tion	Per Foot	Frac-tion	Per Foot	Frac-tion	Per Foot	Frac-tion	Per Foot	Frac-tion	Per Foot	Frac-tion	Per Foot
0-5	60%	$0.80	*28%*	$1.90	10%	$3.00	0%	$5.00	0%	$11.00	2 %	$6.00
5-100	60%	$0.80	*28%*	$1.90	10%	$3.00	0%	$5.00	0%	$11.00	2%	$6.00
100-200	60%	$0.80	*28%*	$1.90	10%	$3.00	0%	$5.00	0%	$11.00	2%	$6.00
200-650	50%	$0.80	*37%*	$1.90	10%	$3.00	1%	$5.00	0%	$11.00	2%	$6.00
650-850	35%	$0.80	*51%*	$1.95	10%	$3.00	2%	$5.00	0%	$11.00	2%	$6.00
850-2,550	20%	$1.20	*59%*	$2.15	10%	$3.00	4%	$5.00	3%	$11.00	4%	$6.00
2,550-5,000	0%	$1.20	*76%*	$2.15	10%	$3.00	5%	$5.00	4%	$11.00	5%	$6.00
5,000-10,000	0%	$1.20	*73%*	$6.00	10%	$20.00	6%	$10.00	5%	$11.00	6%	$6.00
10,000+	0%	$1.20	*54%*	$15.00	25%	$30.00	10%	$18.00	5%	$18.00	6%	$24.00

Note: Fraction % for Normal Trenching is the fraction remaining after subtracting Plow %, Backhoe %, Hand Trench %, Bore Cable % and Push Pipe / Pull Cable %.

B200. Buried Installation and Restoration, Cost per Foot

Definition

The cost per foot to push pipe under pavement , or the costs per foot to cut the surface, place cable in a trench, backfill the trench with appropriately screened fill, and restore surface conditions. Digging a trench in connection with placing buried cable is covered in the preceding section titled, "Distribution Buried Excavation Cost per Foot".

Default Value

Buried Installation and Restoration Costs per Foot									
	Cut/Restore Asphalt		Cut/Restore Concrete		Cut/Restore Sod		Simple Backfill		Restoral Not Req'd
Density Range	Frac-tion	Per Foot	Frac-tion	Per Foot	Frac-tion	Per Foot	Frac-tion	Per Foot	Fraction
0-5	3%	$6.00	1%	$9.00	2%	$1.00	32%	$0.15	62%
5-100	3%	$6.00	1%	$9.00	2%	$1.00	32%	$0.15	62%
100-200	3%	$6.00	1%	$9.00	2%	$1.00	32%	$0.15	62%
200-650	3%	$6.00	1%	$9.00	2%	$1.00	42%	$0.15	52%
650-850	3%	$6.00	1%	$9.00	2%	$1.00	57%	$0.15	37%
850-2,550	5%	$6.00	3%	$9.00	35%	$1.00	30%	$0.15	27%
2,550-5,000	8%	$6.00	5%	$9.00	35%	$1.00	43%	$0.15	9%
5,000-10,000	18%	$18.00	8%	$21.00	11%	$1.00	52%	$0.15	11%
10,000+	60%	$30.00	20%	$36.00	5%	$1.00	4%	$0.15	11%

Note: Restoral is not required for plowing, boring, or pushing pipe & pulling cable. Fraction for Simple Backfill is the fraction remaining after subtracting Restoral Not Required fraction and the cut/restore activities fractions.

B201. Surface Texture Effect

Definition

The increase in placement cost attributable to the soil condition in a main cluster and its associated outlier clusters, expressed as a multiplier of a fraction of all buried or underground structure excavation components in the clusters. The multiplier appears in the "Effect" column, and the fraction appears in the "Fraction of Cluster Affected" column. The surface conditions are determined from the CBG to which the clusters belong.

Default Value

Fraction Cluster Affected	Effect	Texture	Description of Texture
1.00	1.00		Blank
1.00	1.00	BY	Bouldery
1.00	1.00	BY-COS	Bouldery Coarse Sand
1.00	1.00	BY-FSL	Bouldery & Fine Sandy Loam
1.00	1.00	BY-L	Bouldery & Loam
1.00	1.00	BY-LS	Bouldery & Sandy Loam
1.00	1.00	BY-SICL	Bouldery & Silty Clay Loam
1.00	1.00	BY-SL	Bouldery & Sandy Loam
1.00	1.10	BYV	Very Bouldery
1.00	1.10	BYV-FSL	Very Bouldery & Fine Sandy Loam
1.00	1.10	BYV-L	Very bouldery & Loamy
1.00	1.10	BYV-LS	Very Bouldery & Loamy Sand
1.00	1.10	BYV-SIL	Very Bouldery & Silt
1.00	1.10	BYV-SL	Very Bouldery & Sandy Loam
1.00	1.30	BYX	Extremely Bouldery

Fraction Cluster Affected	Effect	Texture	Description of Texture
1.00	1.30	BYX-FSL	Extremely Bouldery & Fine Sandy Loam
1.00	1.30	BYX-L	Extremely Bouldery & Loamy
1.00	1.30	BYX-SIL	Extremely Bouldery & Silt Loam
1.00	1.30	BYX-SL	Extremely Bouldery & Sandy Loam
1.00	1.00	C	Clay
1.00	1.00	CB	Cobbly
1.00	1.00	CB-C	Cobbly & Clay
1.00	1.00	CB-CL	Cobbly & Clay Loam
1.00	1.00	CB-COSL	Cobbly & Coarse Sandy Loam
1.00	1.10	CB-FS	Cobbly & Fine Sand
1.00	1.10	CB-FSL	Cobbly & Fine Sandy Loam
1.00	1.00	CB-L	Cobbly & Loamy
1.00	1.00	CB-LCOS	Cobbly & Loamy coarseSand
1.00	1.00	CB-LS	Cobbly & Loamy Sand
1.00	1.10	CB-S	Cobbly & Sand
1.00	1.00	CB-SCL	Cobbly & Sandy Clay Loam
1.00	1.00	CB-SICL	Cobbly & Silty Clay Loam
1.00	1.00	CB-SIL	Cobbly & Silt Loam
1.00	1.10	CB-SL	Cobbly & Sandy Loam
1.00	1.00	CBA	Angular Cobbly
1.00	1.10	CBA-FSL	Angular Cobbly & Fine Sandy Loam
1.00	1.20	CBV	Very Cobbly
1.00	1.20	CBV-C	Very Cobbly & Clay
1.00	1.20	CBV-CL	Very Cobbly & Clay Loam
1.00	1.20	CBV-FSL	Very Cobbly & Fine Sandy Loam
1.00	1.20	CBV-L	Very Cobbly & Loamy
1.00	1.20	CBV-LFS	Very Cobbly & Fine Loamy Sand
1.00	1.20	CBV-LS	Very Cobbly & Loamy Sand
1.00	1.20	CBV-MUCK	Very Cobbly & Muck
1.00	1.20	CBV-SCL	Very Cobbly & Sandy Clay Loam
1.00	1.20	CBV-SIL	Very Cobbly & Silt
1.00	1.20	CBV-SL	Very Cobbly & Sandy Loam
1.00	1.20	CBV-VFS	Very Cobbly & Very Fine Sand
1.00	1.20	CBX	Extremely Cobbly
1.00	1.20	CBX-CL	Extremely Cobbly & Clay
1.00	1.20	CBX-L	Extremely Cobbly Loam
1.00	1.20	CBX-SIL	Extremely Cobbly & Silt
1.00	1.20	CBX-SL	Extremely Cobbly &Sandy Loam
1.00	1.30	CBX-VFSL	Extremely Cobbly Very Fine Sandy Loam
1.00	1.00	CE	Coprogenous Earth
1.00	1.00	CIND	Cinders
1.00	1.00	CL	Clay Loam
1.00	1.30	CM	Cemented
1.00	1.00	CN	Channery
1.00	1.00	CN-CL	Channery & Clay Loam
1.00	1.10	CN-FSL	Channery & Fine Sandy Loam

Fraction Cluster Affected	Effect	Texture	Description of Texture
1.00	1.00	CN-L	Channery & Loam
1.00	1.00	CN-SICL	Channery & Silty Clay Loam
1.00	1.00	CN-SIL	Channery & Silty Loam
1.00	1.00	CN-SL	Channery & Sandy Loam
1.00	1.00	CNV	Very Channery
1.00	1.00	CNV-CL	Very Channery & Clay
1.00	1.00	CNV-L	Very Channery & Loam
1.00	1.00	CNV-SCL	Channery & Sandy Clay Loam
1.00	1.00	CNV-SIL	Very Channery & Silty Loam
1.00	1.00	CNV-SL	Very Channery & Sandy Loam
1.00	1.00	CNX	Extremely Channery
1.00	1.00	CNX-SL	Extremely Channery & Sandy Loam
1.00	1.00	COS	Coarse Sand
1.00	1.00	COSL	Coarse Sandy Loam
1.00	1.20	CR	Cherty
1.00	1.20	CR-L	Cherty & Loam
1.00	1.20	CR-SICL	Cherty & Silty Clay Loam
1.00	1.20	CR-SIL	Cherty & Silty Loam
1.00	1.20	CR-SL	Cherty & Sandy Loam
1.00	1.20	CRC	Coarse Cherty
1.00	1.20	CRV	Very Cherty
1.00	1.20	CRV-L	Very Cherty & Loam
1.00	1.20	CRV-SIL	Very Cherty & Silty Loam
1.00	1.30	CRX	Extremely Cherty
1.00	1.30	CRX-SIL	Extremely Cherty & Silty Loam
1.00	1.00	DE	Diatomaceous Earth
1.00	1.00	FB	Fibric Material
1.00	1.00	FINE	Fine
1.00	1.00	FL	Flaggy
1.00	1.10	FL-FSL	Flaggy & Fine Sandy Loam
1.00	1.00	FL-L	Flaggy & Loam
1.00	1.00	FL-SIC	Flaggy & Silty Clay
1.00	1.00	FL-SICL	Flaggy & Silty Clay Loam
1.00	1.00	FL-SIL	Flaggy & Silty Loam
1.00	1.00	FL-SL	Flaggy & Sandy Loam
1.00	1.10	FLV	Very Flaggy
1.00	1.10	FLV-COSL	Very Flaggy & Coarse Sandy Loam
1.00	1.10	FLV-L	Very Flaggy & Loam
1.00	1.10	FLV-SICL	Very Flaggy & Silty Clay Loam
1.00	1.10	FLV-SL	Very Flaggy & Sandy Loam
1.00	1.10	FLX	Extremely Flaggy
1.00	1.10	FLX-L	Extremely Flaggy & Loamy
1.00	1.00	FRAG	Fragmental Material
1.00	1.10	FS	Fine Sand
1.00	1.10	FSL	Fine Sandy Loam
1.00	1.00	G	Gravel

Fraction Cluster Affected	Effect	Texture	Description of Texture
1.00	1.00	GR	Gravelly
1.00	1.00	GR-C	Gravel & Clay
1.00	1.00	GR-CL	Gravel & Clay Loam
1.00	1.00	GR-COS	Gravel & Coarse Sand
1.00	1.00	GR-COSL	Gravel & Coarse Sandy Loam
1.00	1.00	GR-FS	Gravel & Fine Sand
1.00	1.00	GR-FSL	Gravel & Fine Sandy Loam
1.00	1.00	GR-L	Gravel & Loam
1.00	1.00	GR-LCOS	Gravel & Loamy Coarse Sand
1.00	1.10	GR-LFS	Gravel & Loamy Fine Sand
1.00	1.00	GR-LS	Gravel & Loamy Sand
1.00	1.00	GR-MUCK	Gravel & Muck
1.00	1.00	GR-S	Gravel & Sand
1.00	1.00	GR-SCL	Gravel & Sandy Clay Loam
1.00	1.00	GR-SIC	Gravel & Silty Clay
1.00	1.00	GR-SICL	Gravel & Silty Clay Loam
1.00	1.00	GR-SIL	Gravel & Silty Loam
1.00	1.00	GR-SL	Gravel & Sandy Loam
1.00	1.10	GR-VFSL	Gravel & Very Fine Sandy Loam
1.00	1.00	GRC	Coarse Gravelly
1.00	1.00	GRF	Fine Gravel
1.00	1.00	GRF-SIL	Fine Gravel Silty Loam
1.00	1.00	GRV	Very Gravelly
1.00	1.00	GRV-CL	Very gravelly & Clay Loam
1.00	1.00	GRV-COS	Very Gravelly & coarse Sand
1.00	1.00	GRV-COSL	Very Gravelly & coarse Sandy Loam
1.00	1.00	GRV-FSL	Very Gravelly & Fine Sandy Loam
1.00	1.00	GRV-L	Very Gravelly & Loam
1.00	1.00	GRV-LCOS	Very Gravelly & Loamy Coarse Sand
1.00	1.00	GRV-LS	Very Gravelly & Loamy Sand
1.00	1.00	GRV-S	Very Gravelly & Sand
1.00	1.00	GRV-SCL	Very Gravelly & Sandy Clay Loam
1.00	1.00	GRV-SICL	Very Gravelly & Silty Clay Loam
1.00	1.00	GRV-SIL	Very Gravelly & Silt
1.00	1.00	GRV-SL	Very Gravelly & Sandy Loam
1.00	1.00	GRV-VFS	Very Gravelly & Very Fine Sand
1.00	1.00	GRV-VFSL	Very Gravelly & Very Fine Sandy Loam
1.00	1.10	GRX	Extremely Gravelly
1.00	1.10	GRX-CL	Extremely Gravelly & Coarse Loam
1.00	1.10	GRX-COS	Extremely Gravelly & Coarse Sand
1.00	1.10	GRX-COSL	Extremely Gravelly & Coarse Sandy Loam
1.00	1.10	GRX-FSL	Extremely Gravelly & Fine Sand Loam
1.00	1.10	GRX-L	Extremely Gravelly & Loam
1.00	1.10	GRX-LCOS	Extremely Gravelly & Loamy Coarse
1.00	1.10	GRX-LS	Extremely Gravelly & Loamy Sand
1.00	1.10	GRX-S	Extremely Gravelly & Sand

Fraction Cluster Affected	Effect	Texture	Description of Texture
1.00	1.10	GRX-SIL	Extremely Gravelly & Silty Loam
1.00	1.10	GRX-SL	Extremely Gravelly & Sandy Loam
1.00	1.20	GYP	Gypsiferous Material
1.00	1.00	HM	Hemic Material
1.00	1.50	ICE	Ice or Frozen Soil
1.00	1.20	IND	Indurated
1.00	1.00	L	Loam
1.00	1.00	LCOS	Loamy Coarse Sand
1.00	1.10	LFS	Loamy Fine Sand
1.00	1.00	LS	Loamy Sand
1.00	1.00	LVFS	Loamy Very Fine Sand
1.00	1.00	MARL	Marl
1.00	1.00	MEDIUM coarse	Medium Coarse
1.00	1.00	MK	Mucky
1.00	1.00	MK-C	Mucky Clay
1.00	1.00	MK-CL	Mucky Clay Loam
1.00	1.00	MK-FS	Muck & Fine Sand
1.00	1.00	MK-FSL	Muck & Fine Sandy Loam
1.00	1.00	MK-L	Mucky Loam
1.00	1.00	MK-LFS	Mucky Loamy Fine Sand
1.00	1.00	MK-LS	Mucky Loamy Sand
1.00	1.00	MK-S	Muck & Sand
1.00	1.00	MK-SI	Mucky & Silty
1.00	1.00	MK-SICL	Mucky & Silty Clay Loam
1.00	1.00	MK-SIL	Mucky Silt
1.00	1.00	MK-SL	Mucky & Sandy Loam
1.00	1.00	MK-VFSL	Mucky & Very Fine Sandy Loam
1.00	1.00	MPT	Mucky Peat
1.00	1.00	MUCK	Muck
1.00	1.00	PEAT	Peat
1.00	1.00	PT	Peaty
1.00	1.50	RB	Rubbly
1.00	1.50	RB-FSL	Rubbly Fine Sandy Loam
1.00	1.00	S	Sand
1.00	1.00	SC	Sandy Clay
1.00	1.00	SCL	Sandy Clay Loam
1.00	1.00	SG	Sand & Gravel
1.00	1.00	SH	Shaly
1.00	1.00	SH-CL	Shaly & Clay
1.00	1.00	SH-L	Shale & Loam
1.00	1.00	SH-SICL	Shaly & Silty Clay Loam
1.00	1.00	SH-SIL	Shaly & Silt Loam
1.00	1.50	SHV	Very Shaly
1.00	1.50	SHV-CL	Very Shaly & Clay Loam
1.00	2.00	SHX	Extremely Shaly
1.00	1.00	SI	Silt

Fraction Cluster Affected	Effect	Texture	Description of Texture
1.00	1.00	SIC	Silty Clay
1.00	1.00	SICL	Silty Clay Loam
1.00	1.00	SIL	Silt Loam
1.00	1.00	SL	Sandy Loam
1.00	1.00	SP	Sapric Material
1.00	1.00	SR	Stratified
1.00	1.00	ST	Stony
1.00	1.00	ST-C	Stony & Clay
1.00	1.00	ST-CL	Stony & Clay Loam
1.00	1.00	ST-COSL	Stony & Coarse Sandy Loam
1.00	1.10	ST-FSL	Stony & Fine Sandy Loam
1.00	1.00	ST-L	Stony & Loamy
1.00	1.00	ST-LCOS	Stony & Loamy Coarse Sand
1.00	1.10	ST-LFS	Stony & Loamy Fine Sand
1.00	1.00	ST-LS	Stony & Loamy Sand
1.00	1.00	ST-SIC	Stony & Silty Clay
1.00	1.00	ST-SICL	Stony & Silty Clay Loam
1.00	1.00	ST-SIL	Stony & Silt Loam
1.00	1.00	ST-SL	Stony & Sandy Loam
1.00	1.10	ST-VFSL	Stony & Sandy Very Fine Silty Loam
1.00	1.20	STV	Very Stony
1.00	1.20	STV-C	Very Stony & Clay
1.00	1.20	STV-CL	Very Stony & Clay Loam
1.00	1.20	STV-FSL	Very Stony & Fine Sandy Loam
1.00	1.20	STV-L	Very Stony & Loamy
1.00	1.20	STV-LFS	Very Stony & Loamy Fine Sand
1.00	1.20	STV-LS	Very Stony & Loamy Sand
1.00	1.20	STV-MPT	Very Stony & Mucky Peat
1.00	1.20	STV-MUCK	Very Stony & Muck
1.00	1.20	STV-SICL	Very Stony & Silty Clay Loam
1.00	1.20	STV-SIL	Very Stony & Silty Loam
1.00	1.20	STV-SL	Very Stony & Sandy Loam
1.00	1.20	STV-VFSL	Very Stony & Very Fine Sandy Loam
1.00	1.30	STX	Extremely Stony
1.00	1.30	STX-C	Extremely Stony & Clay
1.00	1.30	STX-CL	Extremely Stony & Clay Loam
1.00	1.30	STX-COS	Extremely Stony & Coarse Sand
1.00	1.30	STX-COSL	Extremely Stony & Coarse Sand Loam
1.00	1.30	STX-FSL	Extremely Stony & Fine Sandy Loam
1.00	1.30	STX-L	Extremely Stony & Loamy
1.00	1.30	STX-LCOS	Extremely Stony & Loamy Coarse Sand
1.00	1.30	STX-LS	Extremely Stony & Loamy Sand
1.00	1.30	STX-MUCK	Extremely Stony & Muck
1.00	1.30	STX-SIC	Extremely Stony & Silty Clay
1.00	1.30	STX-SICL	Extremely Stony & Silty Clay Loam
1.00	1.30	STX-SIL	Extremely Stony & Silty Loam

Fraction Cluster Affected	Effect	Texture	Description of Texture
1.00	1.30	STX-SL	Extremely Stony & Sandy Loam
1.00	1.30	STX-VFSL	Extremely Stony & Very Fine Sandy Loam
1.00	3.00	SY	Slaty
1.00	3.00	SY-L	Slaty & Loam
1.00	3.00	SY-SIL	Slaty & Silty Loam
1.00	3.50	SYV	Very Slaty
1.00	4.00	SYX	Extremely Slaty
1.00	1.00	UNK	Unknown
1.00	2.00	UWB	Unweathered Bedrock
1.00	1.00	VAR	Variable
1.00	1.00	VFS	Very Fine Sand
1.00	1.00	VFSL	Very Fine Sandy loam
1.00	3.00	WB	Weathered Bedrock

LABOR ADJUSTMENT FACTOR

B16. Regional Labor Adjustment Factors

Definition

Factors that adjust a specific portion of certain investments by a labor factor adjustment that account for regional differences in the availability of trained labor, union contracts, and cost of living factors. Both the portions of different categories of investments that are affected and the size of adjustment are included as parameters.

Default Value

Regional Labor Adjustment Factor	
Factor	1.0

B16a. Labor Adjustment Factor Weightings

Definition

The fraction of the installed investment affected by the regional labor adjustment factor.

Default Value

Regional Labor Adjustment Factor Fraction of Installed Investment Affected	
Contractor Trenching	.125
Telco Construction – Copper	.164
Telco Construction – Fiber	.364
Telco I&M – NID & Drop	.571
Pole Placing	.518

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